Morgan Aero Products
"Aero-Weigh" Digital Display & Load Cell
User Manual & Parts List

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General Information:

The Morgan Aero model MA8120-2 & MA8120-2S is a combination of a custom crafted pin type load cell and Morgan "Aero-Weigh" precision display which comes calibrated as a unit from Morgan Aero Products. **It does NOT need to be calibrated before each use.** The load cell reader may merely be connected, using the custom cable to the pin type load cell and turned on to begin.

The Morgan "Aero-Weigh" is designed to provide an accurate, lightweight display of load weights. In conjunction with a Morgan Aero load cell and cables one operator is able to accurately observe and manage loads and applied stress on various pieces of equipment. The "Aero-Weigh" has been designed for durability and use in rugged conditions. However, it should be treated as an electronic device: Avoid pulling, tearing, or cutting the cables. Avoid damaging the connectors in the cable connector plugs. Avoid dropping the load cell pin, reader, or battery charger. Avoid immersing the reader, cable or pin in water. To reduce the potential for damage the Aero Weigh is shipped in a protective case (figure page 2 of 13). It should always be stored in the case provided.

If the 'S' option specified: part number MA8120-2S the set includes a 16K-lb shackle for operation with alternate mounted components. This shackle can also be used as an aid in calibration. The operation of the unit is identical with either part number).

Each load cell reader, cable set, and load cell pin is a matched set. The load cell readers or load cell pins from other sets should not be exchanged without contacting Morgan Aero. (See Parts page & page 9 of 13)

The "Aero-Weigh" electronics, battery and display are enclosed in a weatherproof NEMA 4 enclosure with sealed MS style connections. Controls on the display are used to turn the "Aero-Weigh" on and off, and set other functions of the "Aero-Weigh" (see Display section for details)

An internal, 8.4 V 800 mah NiMH rechargeable battery powers the "Aero-Weigh". The charger is a 120 VAC 60hz charger designed especially for charging batteries of the type used in the "Aero-Weigh". The operation time of a completely charged battery is approximately 20 hours. Normal recharge time for a fully discharged battery is 4 hours using the supplied charger. If battery replacement does become necessary it is easily changed by removing the top cover of the load cell reader and unplugging the battery. Replacement batteries are available from Morgan Aero under part number MA9258.

The load cell reader batteries should be kept fully charged to allow the unit to be ready to use at all times. A battery charger is provided. It is connected to the "Aero-Weigh" with the cable provided. The state of charge of the batteries in the load cell is indicated by plugging the load cell reader into the charger. If the charger light shows red continuously, it is charging. If the red light extinguishes immediately the batteries are fully charged. The reader should then be removed from the charger.

The load cell reader and load cell pin should be connected prior to turning on the load cell reader. If the load cell reader is turned on before it is connected, the reader may indicate an overload or other fault code. It also may damage the load cell reader.

The load cell pin cables are sealed with a durable coating. They connect to the load cell pin and load cell reader using the MS style connector.

The load cell pin is a strain gage device which imbedded in a metal pin. Electrical current is transmitted via a cable to the load cell reader. Changes in this current provide the changes in load which are displayed on the digital readout of the load reader. The pin, cable and reader are all calibrated as a system.

Set-Up and Activation of the Load Cell Reader System

The Morgan Aero Products load cell reader comes calibrated and ready to use from the factory. **The load cell reader does NOT need to be calibrated before each use.** The device may merely be assembled and turned on to begin.

Each load cell reader and load cell pin is a matched set. The Load cell readers from other sets should not be exchanged without contacting Morgan Aero.

The load cell reader batteries should be kept fully charged to allow the unit to be ready to use at all times.

The load cell reader and load cell pin should be connected prior to turning on the load cell reader.

1) Prior to turning the unit on ensure the battery has been fully charged (see battery & charger section)
2) Remove the load cell reader from the protective storage case
3) If you are going to perform and engine change, install the load cell pin in the location of the engine change equipment as specified in the Airplane Maintenance Manual (AMM).
4) Prior to turning on the load cell reader connect the cable from the load cell pin to the connector on the top of the "Aero-Weigh" load cell reader (see last figure page 11 of 13). (If load cell reader is turned on without the load cell pin connected the reader could be damaged.)
5) Push and hold the "ON" button on the face of the load cell reader for 2 seconds. (last figure page 11 of 13)(The reader backlight should illuminate and the reader should indicate "0" – meaning zero load is applied) (last figure page 11 of 13)
6) If the reader indicates a value other than "0", push the "Enter/Zero" button to set the value to "0". The reader will now indicate the correct weight on the reader display when a load is applied.
7) Press the 'Off' button to turn the unit off.

Note that the "Aero -Weigh" is programmed to go into a standby battery saving mode after a period of non-use (see Display section for setting the length of non-use). If the reader goes into standby mode, simply press the 'On' button to turn the display on and show the currently applied weight if any had been applied when the battery saving feature was activated.

See the Fault Isolation section of this manual for any operation assistance.

Load Cell Keyboard Functions & Operation:

There are six (6) buttons on the keyboard which surrounds the load cell display. (Figure 1)

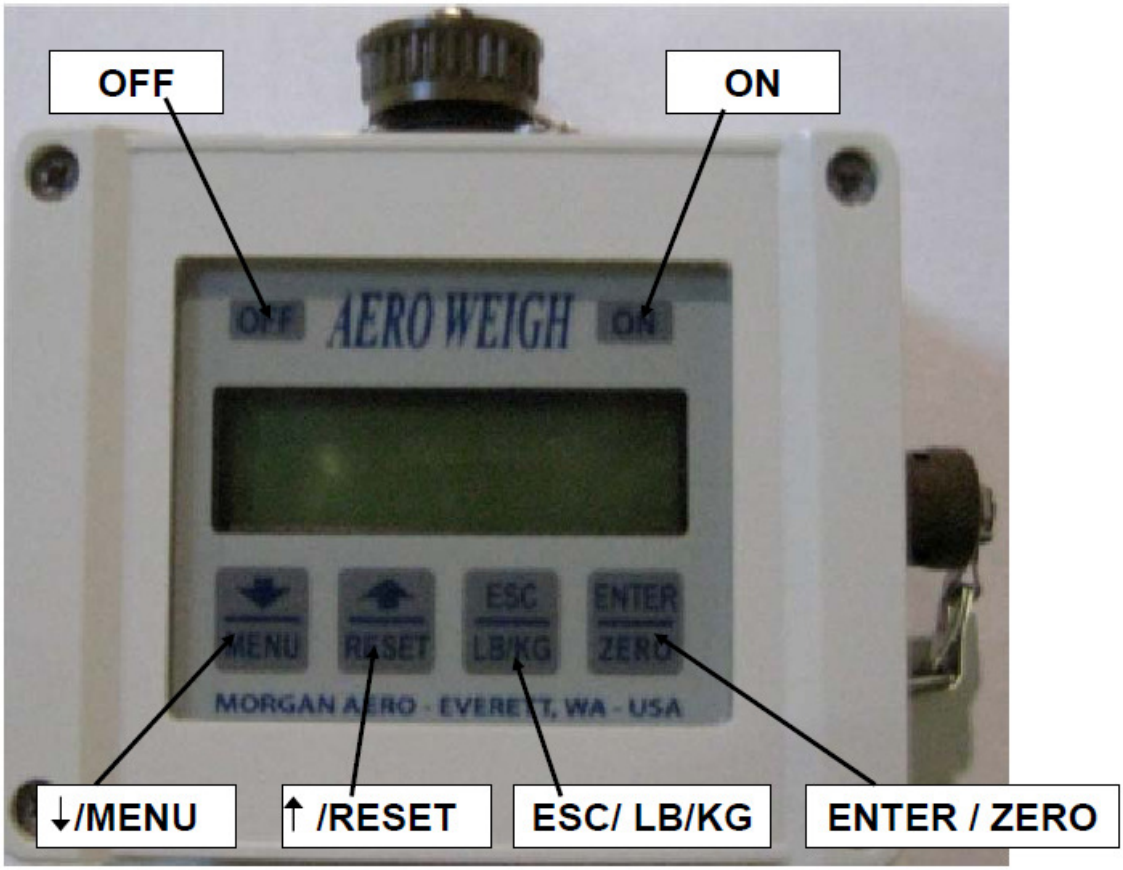


Figure 1

ON – Turns the load cell reader on. Press button for 2 seconds and release.

OFF - Turns the load cell device off. Press button for 2 seconds and release.

DOWN ARROW / MENU – This is a dual function button. While in 'Menu' mode the down arrow is functional. This button is used to enable the 'Menu' mode when Customizing load cell reader functions (The functions in the "Menu" mode are described in the **Customizing the Load Cell Reader Functions section below**.)

UP ARROW / RESET – This is a dual function button. While in 'Menu' mode, the' Up Arrow is functional. If 'Peak' is enabled in setup mode, the Up Arrow doubles as the 'Re-Arm Peak' button. While in normal operating mode this button functions as a load reset button.

ESC / LB/KG – This is a dual function button. ESC is used to exit the 'Menu' mode. When LB/KG is active the button changes the readout between pounds and kilograms.

ENTER / ZERO – This is a dual function button. If pressed when reader is in 'Menu' mode it will select the currently displayed menu item. When pressed during a load measuring operation it will zero the scale – any additional load will be measured form that zero point. (This is a "Tare" function). If this button is depressed when no load is applied the display will show "0".

Customizing Load Cell Reader Functions:

The functions of the load cell reader can be changed using the two (2) Menu modes described below:

Using the Menu Mode:

To enter the Menu Mode when the unit is on press and hold the 'DOWN ARROW / MENU' button for 5 seconds then release it. Within the Menu Mode four (4) items are selectable: (When you have selected the item you want by pressing the DOWN ARROW / MENU' or 'UP ARROW / RESET' buttons. Press the 'ENTER / ZERO' button to enable it). (Note: After 2 minutes of inactivity in this mode the load cell will return to normal mode and display will read "0")

1. FILTER – This mode sets the filter band averaging of the load cell pin signal that is entering the unit. Any weight changes within this band will be displayed as an average. This helps maintain a steady reading with a load that might be in motion. If the band is set at 20 any weight readings with +- 20 pounds will be displayed as an Average.

   To set the filter band:
   After the 'ENTER / ZERO' button has been pushed and the unit is in "Filter" mode the display shows 'FLT XX' (Filter and value in pounds or Kg). Press the 'DOWN ARROW / MENU' or 'UP ARROW / RESET' buttons to adjust the band. Press the 'ENTER / ZERO' button to save the value. The display will now show "0".

2. SETPOINT – This mode allows you to indicate a maximum load you do not wish to exceed. This will be a visual warning that a pre-selected weight has been exceeded. When it is exceeded the display will alternated between the applied weight and 'WT OVER'.

   To set the setpoint:
   After the 'ENTER / ZERO' button has been pushed and the unit is in "Setpoint" mode the display shows 'SP1 XXXXX' (setpoint1 and a load value in pounds or Kg). Press the 'DOWN ARROW / MENU' or 'UP ARROW / RESET' buttons to adjust the weight. Press the 'ENTER / ZERO' button to save the value. The display will now show "0".

3. POWER – This reduces the battery power used by saving by 1) turning the backlight off after a set time the time, or 2) turning the entire load cell off after a set time the time. When 'ENTER / ZERO' button is pushed, the unit may be programmed to save power:

   To set a backlight turnoff time:
   After the 'ENTER / ZERO' button has been pushed and the unit is in "power save" mode the display shows 'BL YES' or 'BL NO' (backlight Yes or backlight No) ;
   (Note: if "BL NO' is displayed and the ENTER / ZERO button is pressed, the load cell will now move on to the power turnoff mode, and the display shows "PWTO YES' or 'PWTO NO'). (see loadcell power turnoff time below for instructions in this mode).
   Press the DOWN ARROW / MENU button until 'BL YES' displays. Press the ENTER / ZERO button. The display shows 'BLTO YES'. Press the ENTER / ZERO button. The display shows 'BLM X.XX' (backlight turnoff time in minutes). Press the DOWN ARROW / MENU or 'UP ARROW / RESET' buttons to set the turnoff time. Press the ENTER / ZERO button. The load cell will now move on to the power turnoff mode, and the display shows "PWTO YES' or 'PWTO NO' (see load cell power turnoff time below for instructions in this mode).
   To have no back light turnoff time:
   After Enter has been pushed and the unit is in "power save" mode the display shows 'BL YES' or 'BL NO' (back ight Yes or back light No) ;
   Pressing the DOWN ARROW / MENU button until 'BL YES' displays.
   (Note: if "BL NO' is displayed and the ENTER / ZERO button is pressed, the load cell will now move on to the power turnoff mode, and the display shows "PWTO YES' or 'PWTO NO') (see load cell power turnoff time below for instructions)
   Press the ENTER / ZERO button. The display shows 'BLTO NO'. Press the ENTER / ZERO button. The load cell will now move on to the power turnoff mode, and the display shows "PWTO' (see loadcell power turnoff time below for instructions).

   To set a load cell power turnoff time:
   When unit is in Power Turnoff Mode (PWTO), the display will read "PWTO YES" or 'PWTO NO'. Press the DOWN ARROW / MENU button until 'PWTO YES' displays. Press the ENTER / ZERO button. The display will show "TOM X.X" (turnoff Minutes). Press the ENTER / ZERO button. The load cell is now set to turn off after the set amount of minutes. The display will read "0".

   To have no load cell turnoff time:

When unit is in Power turnoff Mode (PWTO) the display will read the display will read "PWTO YES" or 'PWTO NO'. Press the DOWN ARROW / MENU button until 'PWTO NO' displays. Press the ENTER / ZERO button. The load cell is now set to turn off after the set amount of minutes. The display will read "0".

4. DIAGNOST (diagnostics) – This mode is used to diagnose problems with the reader or the battery. In this mode the reader will display raw load data (R= XXXX) and load cell reader battery voltage (BV = XX.X).

   To view the diagnostics:
   After the 'ENTER / ZERO' button has been pushed and the unit is in "Diagnostic" mode. The display shows 'R= XXXX' (this is a raw data value) and a load value in pounds or Kg). Press the Press the DOWN ARROW / MENU button until 'BV= XX.X' (battery voltage). Press the ENTER / ZERO button. The load cell is now in normal operating mode. The display will read "0".

Using the Setup Menu Mode:

There are two functions that can be carried out in the Setup Menu Mode: 1) "Setup" and 2) "Calibration". To enter the Setup Menu Mode, start with the unit turned off. Press and hold the 'UP ARROW / MENU' button down. Press the 'ON' button until the display comes on. Release 'ON' button and in three seconds release the 'UP ARROW / MENU' button. The display should now read 'SET UP'. Now press the 'ENTER / ZERO' button to begin 'SET UP' functions. (Note: After 2 minutes of inactivity in this mode the load cell will return to normal mode and display will read "0")

1. SET UP (setup) – This mode allows the user to change increments of load displayed and to change the units of loads displayed on the load cell from Pounds (LBS) to Kilograms (KG).(Only make these changes if they are absolutely necessary)

   To change the increments of units displayed:
   After the 'ENTER / ZERO' button has been pushed and the unit is in Setup Menu Mode. The display will read 'INC XXXX' (Increments of load to be displayed). Press the 'UP ARROW / MENU' button or the 'DOWN ARROW / RESET' button to select the incremental load reading. (For normal usage 1500 should be selected). The available increments are: 1000 1500 2000

2500 3000 5000 10000. When the desired value is selected, press 'ENTER/ ZERO'. The display will now read 'CTBY =XX' (count by a set load range). Press the 'UP ARROW / MENU' button or the 'DOWN ARROW / RESET' button to select the desired incremental Countby. When the desired Countby is selected press the 'ENTER / ZERO' button and 'FS=XXXXX' will display, press the 'ENTER / ZERO' button. The load cell will now move to the load value unit display mode (see section below)

To change the units displayed to Kilograms or Pounds:

After the above steps have been performed, the display will read 'L>K YES' (pounds to Kilogram change? Yes) or 'L>K NO' (pounds to Kilogram change? No). If 'L>K YES' is chosen, the display will now read in pounds, If the display is 'L>K NO' is chosen it will read in kilograms. Press the 'UP ARROW / MENU' button or the 'DOWN ARROW / RESET' button to select the desired value. Press 'ENTER / ZERO ' to enter the setting.

To enable the peak hold function:
After the above steps have been performed, the display will read 'PEAK YES' (set peak value? Yes) or 'PEAK NO' (set peak value? No). If 'PEAK YES' is chosen a peak load value for the reader is set. If the display is 'PEAK NO' is chosen, no peak value is set. Press the 'UP ARROW / MENU' button or the 'DOWN ARROW / RESET' button to select the desired value. Press 'ENTER / ZERO ' to enter the setting.

2. CALIBRATION (Calibration) – This mode allows the user to change the preset calibration of the load cell system when performing a periodic calibration. This should only be done by calibration certification personnel. The load cell system comes pre-calibrated from the manufacturer. (Please see Appendix A. for Calibration instructions).

   WARNING DO NOT ENTER THE CALIBRATION MODE UNLESS YOU ARE GOING TO CALIBRATE THE UNIT AND HAVE BEEN PROPERLY TRAINED OR CERTIFIED IN THIS PROCEDURE

Charging the Internal Battery

To recharge the battery use the supplied Morgan Aero MA9259 charger only.

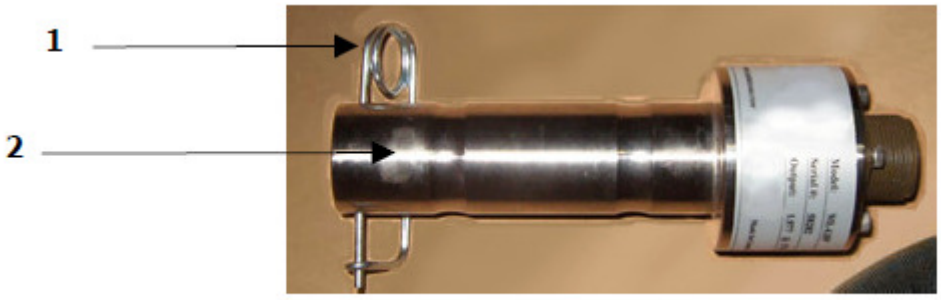
1) Unplug the load cell pin from the "Aero-Weigh" reader.
2) Turn the "Aero-Weigh" reader off.
3) Plug the charger into a 120 VAC outlet BEFORE connecting to the "Aero-Weigh" reader.

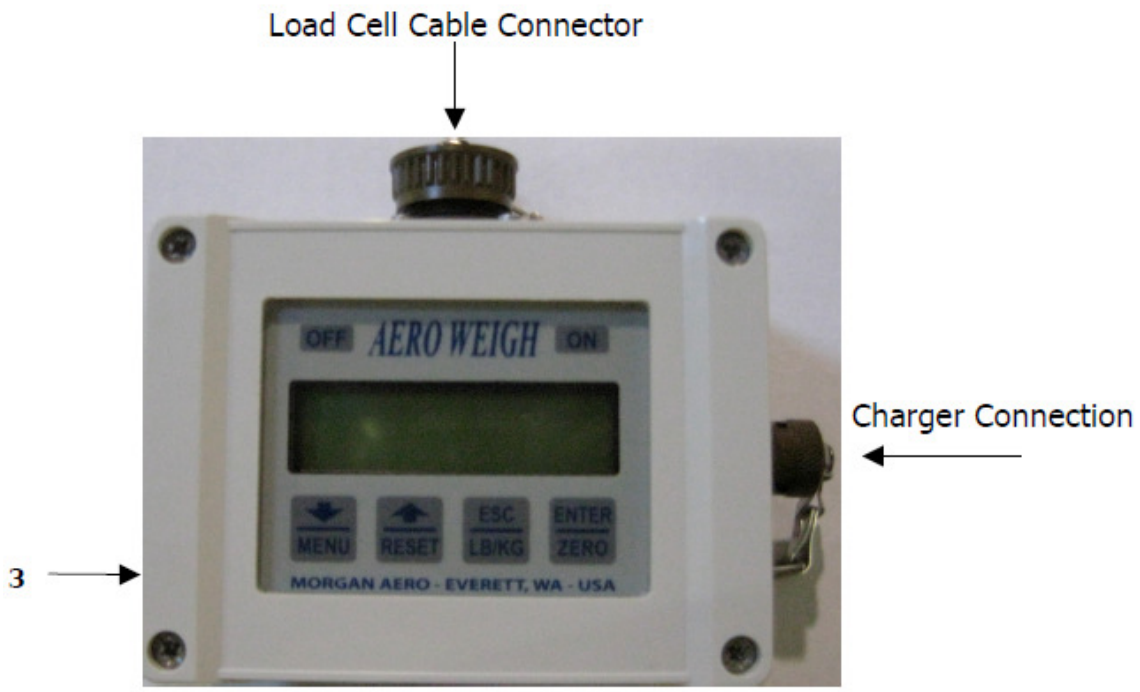
DO NOT USE ANY OTHER CHARGER THAN THE ONE SUPPLIED WITH YOUR "AERO-WEIGH" OR DAMAGE MAY OCCUR!
IF USING THE CHARGER IN A COUNTRY THAT USES A DIFFERENT PLUG CONFIGURATION AND A VOLTAGE OTHER THAN 120 VAC AND 60 CYCLES, OBTAIN A UNIVERSAL ADAPTER WITH A POWER CONVERTER LOCALLY OR A CONVERTER MAY BE OBTAINED FROM MORGAN AERO PRODUCTS.

When the charger is plugged in an indicator light on the front of the charger will flash red two times and then extinguish. This indicates the charger is powered and ready to charge. Next connect the charger output connector to the proper receptacle on the "Aero-Weigh". When the charger is operating and properly connected the indicator light will show red.

Parts List

Item.	Description	Part Number	Quantity Req.
1	Keeper Pin	MA8203	1
2	Load Cell	MA8192	1
3	Display	MA8173	1
	load cell cable, complete MA9267 (Not Shown) dash equals number of feet in length required	MA9267-XX	1





Load Cell Specifications

Load cell maximum capacity	16,000 lb's
Creep (% load in 30 min.)	<.05%
Max. Excitation (V-Acor DC	15.0
Storage Temp. Range (*F)	-58 – 185
Operating Temp. Range (*F)	-58 – 185
Insulation resistance (MΩ@50VDC)	>5000
Input resistance (Ω Nominal)	750
Output resistance (Ω Nominal)	700
Temp. effect on output (% FSO'/*F)	<.008%
Temp effect on zero (% FSO/*F)	<.015%
Output mV/V	2 mV/V (+-) 20%
Accuracy	(+-) 1%
Safe load limit (% capacity)	150%
Wiring Code	Excitation (+) – Pin A Excitation (-) – Pin B Signal (+) – Pin C Signal (-) – Pin D

General Safety Information

1. Always connect the load cell above the load to be weighed.
2. Always make sure the "Aero-Weigh" is fully charged prior to use.
3. Always ensure that the display has been calibrated with the load cell it is to be used with.
4. Make sure all cables are securely tightened.
5. Follow all instructions provided in the aircraft manufactures instructions for the task being performed. In all instances they will take precedence over any instructions provided within.
6. Prior to any use of any lifting equipment check be familiar with the following:

WARNING!
Improper operation of any hoist or lifting device can create a potentially hazardous situation which, if not avoided, could result in death or serious injury. To avoid such a potentially hazardous situation, the operator shall:
1. NOT operate a malfunctioning or unusually performing hoist.
2. NOT lift or pull more than rated load for the hoist
3. NOT use damaged hoist or hoist that is NOT working properly.
4. NOT us a hoist with twisted, kinked, damaged, or worn load chain.
5. NOT operate with an lever extension (cheater bar).
6. NOT attempt to "free chain" the hoist
7. NOT use the hoist to lift, support or transport people.
8. NOT lift loads over people and make sure all personnel remain clear of the supported load.
9. NOT attempt to lengthen the load chain or repair damaged load chain.
10. Protect the hoist's load chain from any damaging contaminates.
11. NOT use load chain as a sling or wrap load chain around load.
12. NOT apply the load to the tip of the hook or to the hook latch.
13. NOT apply load unless load chain is properly seated in the chain sprockets.
14. NOT operate beyond the limits of the load chain travel.
15. NOT leave load supported by the hoist unattended unless specific precautions have been taken.
16. NOT operate the hoist unless load attachments are seated properly.
17. NOT operate a hoist unless all persons are and remain clear of the supported load.
18. REPORT malfunctions or unusual performance of hoist and do not re-use until checked by qualified persons.
19. BE familiar with operation controls, procedures, and warnings.
20. MAINTAIN a firm footing or be otherwise secured when operation the hoist.
21. CHECK brake function by tensioning the hoist prior to each lift.
22. USE hook latches.

23. MAKE sure the hook latches are closed and not supporting any parts of the load.
24. MAKE sure the load is free to move and will clear all obstructions.
25. AVOID swinging the load. KEEP a firm grip on the lever until operation stroke is completed and the lever is at rest.
26. INSPECT the hoist regularly, replace damaged or worn parts, and keep appropriate records of maintenance.
27. USE only recommended parts when repairing the unit.
28. LUBRICATE load chain per maintenance manual
29. NOT permit more than one operator to pull on lever at the same time. More than one operator is likely to cause hoist overload.
30. NOT allow attention to be diverted from proper operation of the hoist.
31. NOT adjust or repair the hoist unless qualified to perform such adjustments or repairs.

Troubleshooting Guide:

The following list the faults and fault messages which may occur and how to solve them.

1) The display is blank after initial setup and power up: Press the "OFF' button and then press the 'ON' button for 2 seconds. (see the start instructions at the beginning of this document). If the display is still blank the battery charge may be too low for it to operate – (go to the battery charge section of this document).

2) "OVRLD" – the load cell reader is receiving an input voltage out of its expected range. (This may occur when the load cell is started and it has a previous signal input stored): Press the 'ENTER /ZERO' button to clear the memory. The display should now read "0".

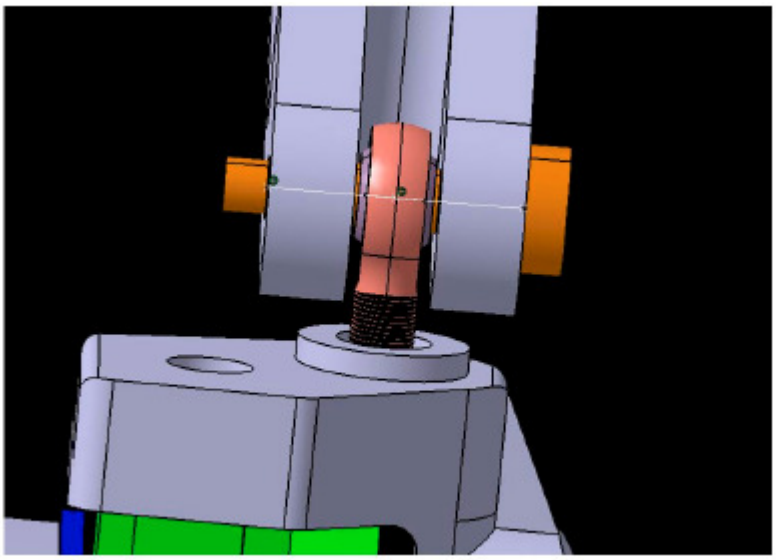
3) "-------"–the load cell reader battery may not charged, or the cable from the load cell reader to the load cell pin may not be connected or may be shorted. Check the cable connections for proper pin alignment and attachment to the couplings, check the cables for damage, check the load cell reader battery charge level (go to the battery charge section of this document). If none of these solutions works return the entire load cell reader system directly to Morgan Aero Products.

Appendix A: CALIBRATION

Calibration of the "Aero-Weigh" is a simple menu driven operation. The load cell and the display should always be used as a matched set. When either component is replaced they must be re-calibrated as a set. Calibration should only be carried out by a qualified technician.

CALIBRATION SET-UP

Initial set-up of the load cell is critical in performing accurate and repeatable calibrations. During normal operation of the load cell system the load cell is used in either the machined fixture end of the boot-strap arm or with a 8.5T shackle and centering spool. When used with the boot-strap arm the load cell is held in the same position every time it is used and the load is always centered under the load cell. It will also be noted that when properly installed on the boot-strap arm the flat on the plug end of the load cell is retained in the up position. This insures that the load applied will always be in the same place on the load cell. This placement insures accuracy and repeatability.

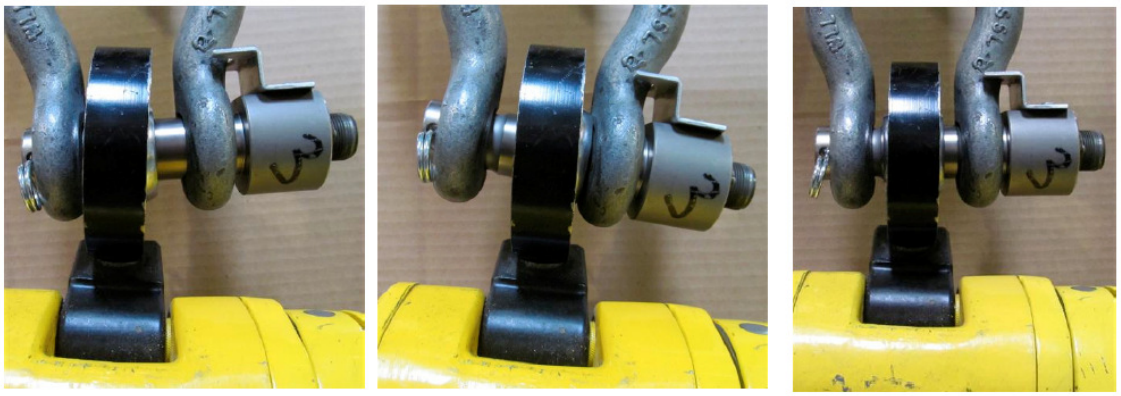


When ordered with the 8.5T shackle a centering spool and small keeper are supplied so that when used the load cell load is again centered in the same location. (see below)

Load Cell & Shackle Part

Parts As Used

In order to ensure that your load cell and display always display an accurate reading when used it is important to make sure it is always calibrated and used with the load cell in the same position and the load bearing on the center portion of the load cell. When used on the bootstrap tool or with the optional shackle and spool the proper configuration for use and calibration is maintained. If calibration is performed without the use of the optional shackle and spool always maintain the load cell as shown in picture 'C' below.



A-Incorrect B-Incorrect C-Correct

Also ensure that the flat on the load cell connector end is on top and at a right angle to the load being applied.

FAILURE TO CONFIGURE THE LOAD CELL OR THE DISPLAY DURING CALIBRATION OR USE WILL RESULT IN INACCURATE READINGS THAT CAN CAUSE SEVERE PERSONNEL INJURY, DEATH OR DAMAGE TO EQUIPMENT.

The "Aero-Weigh" and the supplied load cell are a matched set and the "Aero-Weigh **MUST** be calibrated to the load cell that it will be used with. Load cells and displays **MUST NOT BE SWITCHED WITHOUT RE-CALIBRATION** prior to use.
When equipment is received it has been calibrated as a set. The display has an identification tag marked with its serial number and the serial number of the load cell it has been calibrated with. (See Fig. 1)

Aero-Weigh

System Serial Number: _____
Display PN: MA9257 Load Cell PN: MA8192
Display SN: _____
Has been calibrated with & must be used with:
Load Cell SN: _____
If either the display or load cell are replaced record new serial numbers & insure they are calibrated and used as a matched set.

Fig. 1

To properly identify the load cell the serial number of each load cell is located as seen in Fig. 2

Fig. 2

The load cell also contains capacity, part number and other information as seen in Fig. 3.

Fig. 3

Ensure that the battery has been completely charged.

DO NOT PRESS THE "ON" BUTTON UNTIL BOTH THE "AERO-WEIGH" AND THE LOAD CELL HAVE BEEN CONNECTED TOGETHER OR THE DISPLAY MAY BE DAMAGED

1) Connect the load cell to the Unit with the cable connector.
2) While holding down the "MENU" button, turn the unit on by pressing the "ON" button. After the display comes on release the "ON" button, count to three and release the "UP ARROW / MENU" button. You should see "SET UP" displayed, if not repeat this step.

WHEN "SETUP" IS DISPLAYED DO NOT PRESS THE ENTER BUTTON UNLESS YOU HAVE CONFIRMED WITH SUPERVISORY PERSONEL A SYSTEM CHANGE IS NECESSARY. DOING SO COULD CAUSE FACTORY SETTINGS TO BE CHANGED AND RESULT IN INCORRECT READINGS OR OPERATOR CONFUSION THAT COULD RESULT IN INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT!

3) When "SET UP" is displayed press the up arrow button and "DO CALIB" will be displayed, press the 'ENTER / ZERO' button and "APPLY WEIGHT" will be displayed. The unit is now ready to calibrate.

4) Slowly apply the known test load.

5) Press the "ENTER/ZERO" button and the display will show a weight reading. This reading may or may not be the actual applied weight. To calibrate the unit to the actual applied load use the "UP ARROW / RESET" button and "DOWN ARROW / MENU" button to adjust the displayed reading to the actual weight of the test load.

6) When the display matches the known weight of the test load, press the "ENTER / ZERO" button and remove the weight. The unit is now calibrated to within 1.5% FS. To check the accuracy, apply varying known weights and compare to the displayed reading, if necessary repeat the calibration procedure.